

SWIVELING VALVE OPERATOR MOUNTING SYSTEM

BACKGROUND OF THE INVENTION

1. Field of the invention

The present invention relates to the mounting of Hydraulic Valve Operators, and more specifically to underground valve operators that are mounted on trailers, pickup trucks and other transporting means.

2. Description of the Prior art

Hydraulic valve operators are known in the art. They are used to turn underground valves that are found in water and gas distributions systems. Since the valves are designed to be underground, it is expected that the valves will be operated very infrequently. It is not unusual for these valves to have successive operations that are several years apart. When the valves are not operated for these extended periods, it is common for the valves to become stuck due to the accumulation of debris, deposits, silt, corrosion and the like. Due to these accumulations, the valves will become very stiff or even stuck, requiring mechanical means to overcome the rotational resistance due to the buildup of debris.

Prior art patents show the hydraulic valve operators, but do not allow for easy rotational movement of the valve operator, allowing the hydraulic valve operator to be positioned in a favorable position, with a minimum of personnel.

A typical embodiment of prior art patents is patent number 5,570,581 by Kirk H. Preston. The patent discloses a hydraulic valve operator mounted on a sectional frame. The frame is mounted on a motor vehicle that delivers the valve operator to the work site. There is a stationary frame section that is mounted to the vehicle. An extendable frame section is telescopically extended from the stationary frame section to allow a valve drive rod to be aligned with the underground valve, thereby closing or opening the valve.

The disadvantage of this type of mounting is that the truck, vehicle or trailer must be driven into a position that aligns the valve operator directly over the underground valve to be operated. If

the valve operator is not positioned directly over the valve, the truck must be repositioned until the valve operator is vertically aligned with the valve.

U. S. Patent Number 3,847,039 by Shoziro Azuma, discloses a “Valve Operating Device”. This patent discloses a valve stem rotating head that is mounted onto a flexible shaft, where the entire device is mounted onto a swingable boom. The swingable boom is shown mounted onto a truck bed. The patent drawings depict the turntable mounted close to a corner of the truck bed, in this case the driver rear location. This type of system only operates when the swingable boom is in it’s open position, here at ninety degrees, while the present invention will operate at multiple angles and extensions. Additionally, this mounting will yield some serious problems with the overall structural strength of the mounting system. When the valve operator is in it’s full open position, there is a great load transmitted to the turntable. As the distance to the turntable is increased, the force that the turntable must support is increased by the distance multiplied by the weight (moment). This moment must be reacted by the turntable, and then supported by the truck bed. The loading capacities of the turntables are limited, and as a result, the costs involved with the turntable increase. The present invention overcomes the inherent limitations of the patent by relocating the turntable to the center, biased towards the rear of the truck bed, and additionally adds a support in the form of a locking feature. This locking feature is wide enough to allow rollers to bear against the plate to overcome the large moments due to weight and distance. Additionally the current invention allows a full 180° rotation, and has stops to prevent over rotation and therefore damage to the unit.

SUMMARY OF THE INVENTION

Briefly and in general terms, the present invention has a rotating valve head mounted onto an extending Swiveling Valve Operator Mounting System. The Swiveling Valve Operator Mounting System is attached to a turntable mount that is located essentially in the middle of a truck bed or a trailer bed, or similar type vehicle. The Swiveling Valve Operator Mounting System is allowed to rotate about the turntable. The Swiveling Valve Operator Mounting System has rollers that bear against a bearing plate. The bearing plate has at least two essential purposes. Firstly, the bearing plate acts as a device that positionally locks the Swiveling Valve Operator Mounting

System in it's correct angular position in order to allow the rotating valve head to be positioned over the valve to be operated upon. Secondly, the bearing plate provides a smooth surface for the Swiveling Valve Operator Mounting System's rollers to ride upon. This reduces the effective loading of the bearing plate allowing for a more economical choice. At that point, the Swiveling Valve Operator Mounting System may be extended to position the valve rotating head above the valve to be turned.

Other features and advantages of the invention will become apparent from the following detailed description, taken in conjunction with the accompanying drawings, which illustrate by way of example, the features of the invention

DESCRIPTION OF THE DRAWINGS

Figure one shows a side view of the trailer mounted Swiveling Valve Operator Mounting System assembly

Figure two shows a plan view of the Swiveling Valve Operator Mounting System assembly (trailer mounted)

Figure three shows a side view of the Swiveling Valve Operator Mounting System assembly (trailer mounted)

Figure four shows a detail view of the rear portion of the Swiveling Valve Operator Mounting System assembly

Figure five shows a detail view of the bumper mount.

Figure six shows a detail view of the roller assembly and the locking feature of the Swiveling Valve Operator Mounting System assembly.

Figure seven shows a detail view of the Swiveling Valve Operator Mounting System

assembly extended.

Figure eight shows the Swiveling Valve Operator Mounting System assembly mounted on a truck bed.

Figure nine shows the Swiveling Valve Operator Mounting System assembly extended and rotated (truck mounted).

Figure ten shows an exploded view of the Swiveling Valve Operator Mounting System Mount Assembly.

Figure eleven shows a top view of the frame and turntable mount.

Figure twelve shows a cross section of the frame, turntable mount, and the truck/trailer bed

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

With respect to figures one and three, a trailer mounted Swiveling Valve Operator Mounting System (1) is shown in an extended “operator” position. The valve operator (2) is a series of components comprising a hydraulic pump (104), a hydraulic motor or swivel housing (100), and a hydraulic fluid reservoir (102). The swivel housing (100) is shown at a first or telescoping end (4) of an extensible mounting frame (6).

With respect to figure two through twelve, the mounting frame (6) is shown in a travel position, where the mounting frame (6) is oriented towards a rear portion (10) of a truck or trailer bed (12), said truck bed defining a horizontal plane. A bearing plate (14) is shown mounted on a top portion (16) of the truck or trailer bed (12). The bearing plate (14) is shown as arcuate shaped (18) having a width “W” (20). The bearing plate (14) has an arc length “L” (22) where the arc length (22) is based upon the capability of the mounting frame (6) to rotate through at least a one hundred eighty degree (180°) rotational arc. A first travel stop (24) and a second travel stop (26) are each positioned and attached onto the bearing plate (14) at the maximum angular travel limits of the mounting frame (6). The travel stops (24, 26) are made from standard structural shapes common in the industry, and

have elastomeric bumper stops (28) attached thereon. The elastomeric bumper stops (28) prevent scuffing or damage to the mounting frame (6) when moved to the maximum angular position. The bearing plate (14) has a series of holes (30) defined therein said series of holes (30) being arcuate shaped on said bearing plate (14). The arcuate series of holes (30) are located on an outer section (32) of the bearing plate (14), and are spaced at two inch (2") increments within the permissible travel of the mounting frame (6). Other embodiments would place the arcuate series of holes (30) in an inner section (34) of the bearing plate (14), but this would be of dubious value, as access to locking features (defined infra) would be restricted. Additionally the series of holes (30) would be masked by supports (defined infra) further restricting access to the locking features.

Several embodiments of mounting frame (6) may be incorporated in this invention. One embodiment of mounting frame (6) was fully defined in patent number 5,570,581 by Kirk Preston, one of the inventors of the present disclosure. The mounting frame (6) is essentially made from a first frame section (36) and a second frame section (38) that are open ended. A first frame rail (40) and a second frame rail (42) are each telescopically received into the first and second frame section (36, 38). At least two (2) lateral beams (44) rigidly attach the first frame section (36) and the second frame section (38) securing them in a parallel relationship to each other. The hydraulic motor or swivel housing (100) is attached to the telescoping end (4) of the mounting frame (6), the telescoping end (4) of the mounting frame (6) consisting of the first frame rail (40) and the second frame rail (42). The hydraulic fluid reservoir (102) and hydraulic pump (104) are fixedly attached to the mounting frame (6). Means to securely lock the first and second frame rail (40, 42) to the first and second frame section (36, 38) in an extended and a closed position, are incorporated in the previous invention. A valve key (8) is shown inserted through the swivel housing (100) and into a hole in the ground in order to open or close an underground valve.

With respect to figure four (4) the rear of the invention is shown. A first wheel assembly (46) is shown attached to the first frame section (36). The first wheel assembly (46) consists of a support wheel assembly (48), common in the industry, attached to a first mounting bracket (50). The first mounting bracket (50) is then attached to the first frame section (36). A second wheel assembly (52) consisting of a support wheel (48) and a first mounting bracket (50) is attached to the second frame section (38). The first and second wheel assembly (46, 52) are positioned over the bearing plate (14)

and allow smooth movement over the bearing plate (14).

A first rotation lock assembly (54) is shown attached to the first frame section (36). The first rotation lock assembly (54) consists of a second mounting bracket (56). The second mounting bracket has a horizontal plate (58) and a vertical plate (60). The horizontal plate (58) and the vertical plate (60) are attached at ninety degrees (90°) to each other. The horizontal plate (58) has a hole (62) defined therein, the hole (62) allows a retractable spring loaded pin (64), common in the industry, to be attached therethrough. The hole (62) is positioned to be in line with any one of the series of holes (30) defined in the bearing plate (14). The first rotation lock assembly (54) is attached to the first frame section (36). A second rotation lock assembly (66) is attached to the second frame section (38).

The second rotation lock assembly (66) consists of a third mounting bracket (57). Said third mounting bracket (67) has a horizontal plate (58) and a vertical plate (60). The horizontal plate (58) and the vertical plate (60) are attached at ninety degrees (90°) to each other. The horizontal plate (58) has a hole (62) defined therein, the hole (62) allows a retractable spring loaded pin (64), common in the industry, to be attached therethrough. The hole (62) is positioned to be in line with any one of the series of holes (30) defined in the bearing plate (14). The first rotation lock assembly (54) and the second rotation lock assembly (66) may be identical. This embodiment shows the first and second rotational lock assemblies (54, 66) positioned in front of the first and second wheel assemblies (46, 52). The first and second rotation lock assemblies (54, 66) are constructed and positioned to allow each retractable spring loaded pin (64) to engage one of the series of holes (30) in the bearing plate (14) in a lock position.

The first frame rail (40) has a first travel lock tab (68) defined thereon. The first travel lock tab (68) has a first central hole (70) defined therein. This embodiment shows the first travel lock tab (68) oriented downwards at forty five degrees (45°) from the horizontal. The second frame rail (42) has a second travel lock tab (72) defined thereon. The second travel lock tab (72) has a second central hole (74) defined therein. The first travel lock tab (68) and the second travel lock tab (72) are essentially in a planar relationship. A bumper (76) is shown attached to the rear of the truck or trailer. The bumper (76) extends outwards from the truck or trailer, protecting the mounting frame

(6) from damage. A first bumper tab (78) is shown attached to the bumper (76). The first bumper tab (78) has a third central hole (80) defined therein. The third central hole (80) of the first bumper tab (78) is diametrically aligned with the first central hole (70) of the first travel lock tab (68). A second bumper tab (82) is shown attached to the bumper (76). The second bumper tab (82) has a fourth central hole (84) defined therein. The fourth central hole (84) is diametrically aligned with the second central hole (74) of the second travel lock tab (72). The first and second bumper tabs (78, 82) are positioned over the first and second travel lock tab (68, 72), respectfully, thereby preventing unwanted vertical and horizontal motion of the mounting frame (6) while in transit. A first pit pin (83) is shown inserted through the first central hole (70) and the third central hole (80), and a second pit pin (86) is shown inserted through the fourth central hole (84) and the second central hole (74), locking the mounting frame to a travel position.

Referring to figures ten through twelve, the bearing plate (14) is shown arc shaped, where a center position (88) is determined, the center position being the arcuate center of the bearing plate (14). A rotating slip, thrust or turntable bearing (90) is shown mounted to the truck or trailer bed at this center position (88). A bracket (92) is attached to the first and second frame sections (36, 38). The bracket (92) is shown biased towards a second or fixed end (5) of said frame section (36, 38). The bracket (92) is attached to the turntable bearing (90). The mounting frame (6) is now free to rotate about the turntable bearing (90) with the first and second wheel assemblies (46, 52) rolling against the bearing plate (14). When the mounting frame (6) has been positioned in the desired angle, the first and second rotational lock assemblies (54, 66) release the retractable spring loaded pin (64) into one each of the series of holes (30) in the bearing plate (14).

In order to facilitate ease of use of the Swiveling Valve Operator Mounting System (1) with end users, a remote throttle (94), choke (96) and ignition(98) would be fitted to the hydraulic gate valve operator (2) to allow the operator to start and stop the hydraulic gate valve operator (2) while in the operator position.

A second embodiment of mounting frame is fully disclosed in patent number 6,009,905 by Arnemann. The disclosed invention is easily adapted to this mounting frame.

The Swiveling Valve Operator Mounting System herein described may be either retrofitted to

existing Hydraulic Valve Operator Mounts that are common and currently used in the industry, or a complete unit may be vended to prospective buyers.

Although the foregoing includes a description of the best mode contemplated for carrying out the invention, various modifications are contemplated.

As various modifications could be made in the constructions herein described and illustrated without departing from the scope of the invention, it is intended _that all matter contained in the foregoing description or shown in the accompanying drawings shall be interpreted as illustrative rather than limiting.